Interior Dust Clean Up Plan

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I. Introduction

This plan is being developed to address the requirements contained in the Administrative of Consent Order, Docket No. 07-2002-0038 concerning item 39 found on page 15. This plan will outline the qualifications, procedures and equipment to be used to clean lead dust from homes in the City of Herculaneum.

Resident's cooperation will be required in that all pictures and knickknacks from surfaces to be cleaned will be removed in advance

It will be the homeowner's responsibility to remove all valuables (money, jewelry, antiques, etc. before work is performed).

Each cleaning contractor will be given a copy of the Dust Clean-up Plan.

The intent of this plan is to address lead dust from smelter related activities only. Lead paint issues are the responsibility of the owners.

II. Worker qualifications and credentials

General Requirements

Contractors will be State of Missouri certified lead abatement contractors.

III. Cleaning methods

A combination of HEPA vacuums and wet cleaning will be used to remove lead dust from ceilings, floors, carpets, walls, drapes, accessible ductwork and upholstered furniture. Contractor will not be responsible for cleaning those areas that are obstructed due to clothes, boxes, and other miscellaneous items obstructing their access.

IV. Plans and Procedures

To the greatest extent possible, residents will be asked to refrain from entering rooms that are being cleaned, or have been cleaned, to reduce the potential for recontamination from those areas that have not yet been cleaned. In the same manner, all visitations by outside parties should be avoided to the utmost.

A. Duct Cleaning: Duct registers and ductwork will be cleaned first. All registers and cold air returns will be removed where possible. The next step will be to insert the suction hose from the HEPA vacuum with a soft bristle brush, if possible, into the register and cold air return, as far as possible to remove as much loose debris as possible. A standard rectangular high efficiency filter will then be installed in the HVAC unit (for example, 3M Filtrate or similar product) where one is being used.

Cleaning of the entire ductwork is not necessary. The USEPA in its publication, *Should You Have the Air Ducts in Your Home Cleaned*, states the following:

"Duct cleaning has never been shown to actually prevent health problems. Neither do studies conclusively demonstrate that particle (e.g. dust) levels in homes increase because of dirty air ducts or go down after cleaning. This is because much of the dirt that may accumulate inside air ducts adheres to duct surfaces and does not necessarily enter the living space. It is important to keep in mind that dirty air ducts are only one of many possible sources of particles that are present in homes. Pollutants that enter the home both from outdoors and indoor activities such as cooking, cleaning, smoking, or just moving around can cause greater exposure to contaminants than dirty air ducts. Moreover there is no evidence that a light amount of household dust or other particulate matter in a ducts poses any risk to health."

It is also our understanding, after having conversation with the lead abatement training staff at the St. Louis University School of Public Health, that there is no solid information linking lead problems to ventilation systems. They are teaching individuals to clean the registers and as far back in the ductwork as practical. In terms, of carpet testing

they are instructing individuals to use the same method for carpets as hard floor surfaces (wipe samples).

B. Attic – If an attic that is regularly accessed by a child less than 72 months of age unsupervised and has been turned into an additional room with a floor, walls, etc., this area will be cleaned first. Attics that are not used by children will be caulked shut, or other method of sealing with the homeowner's permission. The next subsequent level will be cleaned next. Where applicable, dry basements (no crawl space or "dug" basements) will be cleaned last. If an outside entrance is available it will be the preferred method of entry and exit from the basement subject to site conditions. Detached garages will not be addressed. Contractor will not be required to move items that are directly on the floor of the basements and or attics.

C. Interior walls, doors, windowsills and ceilings: Using a HEPA vacuum with a soft bristle brush, the contractor will vacuum all ceiling surfaces. Then starting at the top of each wall, vacuum every inch of surface on the walls and windowsills.

D. Drape Cleaning: Drape cleaning to be conducted after the ceiling is complete. Drape cleaning procedures will consist of using a HEPA vacuum with a soft bristle brush. Both sides of the drape will be vacuumed.

E. Upholstered Furniture: Upholstered furniture will be HEPA vacuumed.

F. Floors: Floors will be vacuumed using a HEPA vacuum using either a carpet tool or a hard surface tool. Hard surface floors will then be wet cleaned using detergent.

G. Carpets: Carpets will be vacuumed using a HEPA vacuum with a carpet tool. Non-Berber type carpets will be water extracted using a carpet extractor after vacuuming. Berber type carpets will be vacuumed twice. The cleaning crew will not be responsible for removing any stains.

H. Confirmation sampling will be conducted in accordance with 40 CFR Part 475 Subpart D (See ASTM E 1728 –95 in Appendix C). A sample will be taken form each of the following rooms where practical according to the above procedures

1. Center of kitchen floor
2. Center of living room floor
3. Window sill of youngest child's room
4. Center of youngest child's room

For those hard surface areas that do not pass clearance sampling, those areas will be recleaned. Wipe samples for carpets that exceed 40 ug Pb/ft2, will be recleaned. Those homes that have children less than 72 months of age living there and whose carpets fail the clearance levels that choose not to participate in the voluntary property purchase program will be recleaned up to twice more. Should the carpet not pass on the third attempt, a HEPA vacuum will be offered, if they haven't already received a HEPA vacuum.

I. Lead survey

A lead survey will be of the residence not limited to the following:

- A questionnaire about potential lead sources (Appendix C)
- XRF analysis of painted wood surfaces (unpainted surfaces will not be screened)
- Painted surfaces will be rated with a relative rating assigned to each surface tested from 1 to 3, 1 good, 2 fair, and 3 poor

A pre-inspection, post-inspection and lead survey will be conducted using the forms found in Appendix A and Appendix C.

V. QA/QC

Only accredited laboratories experienced in lead analysis will be used for analysis of the clearance samples.

Samples will be collected from hard floor surfaces, carpets and windowsills. Appropriate change of custody forms will accompany all samples. A minimum of four (4) samples will be obtained per residence.

Only those portions of the attached QAPP (Appendix D) that pertain to dust sampling are applicable to this plan.

VII. Health and Safety Plan

Workers being assigned to work on interior house dust cleaning must follow safety and health protocols for their own protection and the protection of the residences of the household. Workers will have been trained in the safe management and removal of lead dust as part of their Missouri certification training for lead abatement workers.

Workers must follow OSHA Lead Standard regulations and the lead abatement rules. Workers will be trained, have initial blood testing, be monitored on the job for air lead levels in conducting the dust removal, wear protective clothing as appropriate, and only eat, smoke, or chew tobacco in non-contaminated locations. Level D protective equipment will be worn unless air monitoring indicates the need for a higher level of protection.

Special attention should be paid to physical hazards. Slip, trip and fall hazards may be present upon entry or caused by the clean-up process. Electrical hazards may be present upon entry or caused by the cleanup process. Electrical hazards may be encountered in the cleanup process, due to wet condition, improper wiring, or a host of other circumstances. Chemical hazards may also exit from a variety of household chemicals. Wooden staircases should be watched for rotting wood, especially in wet damp basements.

Workers must leave the property in the same physical condition as it was found, but cleaned to a point where it will meet clearance levels.

Emergency services are available from the following agencies:

Nearest Fire Station:
Herculaneum Fire Department

High Street
Herculaneum, Missouri
911 for emergencies, or 636-475-3080

Nearest Police Department
Herculaneum Police Department
#1 Parkwood Court
Herculaneum, Missouri
911 for emergencies, or 636-479-3922

Nearest Ambulance District
Joachim-Plattin Ambulance District
619 Collins
Festus, Missouri
911 for emergencies, or 636-937-2224

Nearest Hospital:
Jefferson Memorial Hospital
Highway 61-67 at Highway 55
Festus, Missouri
636-933-1000,

Each contractor will ultimately be responsible for the health and safety of its employees.

APPENDIX A

Pre and Post Inspection Sheet

PRE & POST INSPECTION SHEET

Name:
Address:
City: State:
Zip:

Square Feet:
Number of Rooms:
Number of Registers:
Number of Cold Air Returns:
Number of Rooms with Carpet:
Condition of carpet in each room:
Number of Rooms with Hard Floors (tile, wood, concrete, etc.):
Condition of Hard Floors:
Type of Walls (drywall, plaster, wallpaper, etc.):
Condition of walls and surfaces:

Any Inside Damage Prior to Cleaning:

Room Name
Wall
Floor
Ceiling

Room Name
Wall
Floor
Ceiling

Room Name
Wall
Floor
Ceiling

Room Name
Wall
Floor
Ceiling

Room Name
Wall
Floor
Ceiling

Furniture Not Removed:
Room Name
Room Name
Room Name
Room Name
Room Name

Shelves, Pictures, etc. Not Removed:

Room Name
Room Name
Room Name
Room Name
Room Name

Vents Nailed to Floor (not removable w/o possible damage):
Room Name
Room Name
Room Name
Room Name
Room Name

Vents Not Removable:

Room Name

Room Name

Room Name

Room Name

Room Name

Painted surfaces in poor condition

Room Name

Room Name

Room Name

Room Name

Room Name

Furnace Filter Replacement

(Example: 16 x 20 x 1)

Filter Size: x x

Paint inside or outside that is peeling or is showing abrasion marks (doors/windows)

What is the location (window sill, etc.)

Access to Attic: Yes No

Location:

Types of Ceilings: (Acoustic, Drop, Drywall, Plaster, etc.)

Contractor shall not be held liable for any loose wallpaper, damage duct, loose carpet, damaged tile, wood, etc. (hard surface) or any other surface that was cleaned during this process.

Pre Inspection Performed by:

Post Inspection Performed by:

Customer comments, if any:

Contractor comments, if any:

Appendix B

Clearance Sampling Procedure

ASTM Method E 1728 –95

Designation: E 1728 – 95

Standard Practice for Field Collection of Settled Dust Samples Using Wipe Sampling Methods for Lead Determination by Atomic Spectrometry Techniques[1]

This standard is issued under the fixed designation E 1728; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice covers the collection of settled dusts on hard surfaces using the wipe sampling method. These samples are collected in a manner that will permit subsequent digestion and determination of lead using laboratory analysis techniques such as Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), and Graphite Furnace Atomic Absorption Spectrometry (GFAAS).

1.2 This practice is used to collect samples for subsequent determination of lead on a loading basis (micrograms of lead per area sampled). This practice cannot be used to collect samples for subsequent determination of lead on a concentration basis (micrograms of lead per gram of settled dust collected).

1.3 This practice is not intended for collection of settled dust samples from rough or porous surfaces such as upholstery and carpeting.

1.4 This practice does not address the sampling design criteria (that is, sampling plan that includes the number and location of samples) that are used for risk assessment and other purposes. To provide for valid conclusions, sufficient numbers of samples must be obtained as directed by a sampling plan.

1.5 This practice contains notes that are explanatory and are not part of the mandatory requirements of this practice.

1.6 The values stated in SI units are to be regarded as the standard.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 *Definitions:*

2.1.1 *batch*—a group of field or quality control (QC) samples that are collected or processed together at the same site using the same reagents and equipment.

2.1.2 *field blank*—a wipe that is exposed to the same handling as field samples except that no sample is collected (no surface is actually wiped). Analysis results from field blanks provide information on the analyte background level in the wipe combined with the potential contamination experienced by samples collected within the batch resulting from handling.

2.1.3 *sampling location*—a specific area within a sampling site that is subjected to sample collection. Multiple sampling locations are commonly designated for a single sampling site.

2.1.4 *sampling site*—a local geographical area that contains the sampling locations. A sampling site is generally limited to an area that is easily covered by walking.

2.1.5 *wipe*—disposable towelettes moistened with a wetting agent (see 2.1.5.1 and 2.1.5.2). These towelettes are used to collect the sample and to clean sampling equipment. Wipe brands or sources selected for use shall not contain significant background lead levels (see 2.1.5.1). Wipe brands or sources selected for use shall be of adequate width and thickness to perform the collection procedure (see 2.1.5.2).

2.1.5.1 *Discussion 1*—Laboratory analysis on replicate blank wipes should be used to determine background lead levels prior to use in the field. Brands of wipes that contain aloe should be avoided due to increased potential of significant background lead in these wipes. Background lead levels less than 5 μg per wipe are considered insignificant for most investigative purposes.

2.1.5.2 *Discussion 2*—A thin wipe having dimensions of approximately 15 by 15 cm is recommended. Use of multiple or extra-thick wipes can cause problems with laboratory analysis activities. Use of wipes with smaller dimensions may not be capable of holding settled dust contained within the sampling area.

2.1.6 *wipe sampling kit*—a sealable rigid walled container with 50 mL minimum volume (see 2.1.6.1). The kit must also include a separate container of clean uncontaminated wipes for use in collecting samples. One container of bulk packed wipes is typically used for collection of multiple samples.

2.1.6.1 *Discussion*—Use of a resealable plastic bag for holding and transporting the settled dust wipe sample is not recommended due to the potential losses of settled dust within the plastic bag during laboratory handling. Quantitative removal and processing of the settled dust wipe sample by the laboratory is significantly improved through the use of sealable rigid walled containers.

3. Summary of Practice

3.1 Wipe samples of settled dust are collected on hard surfaces from areas of known dimensions with moistened disposable towelettes using a specified pattern of wiping.

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[1] This practice is under the jurisdiction of ASTM Committee E-6 on Building Constructions and is the direct responsibility of Subcommittee E06.23 on Lead Paint Abatement.

Current edition approved Aug 15, 1995. Published October 1995.

4. Significance and Use

4.1 This practice is intended for the collection of settled dust samples in and around buildings and related structures for the subsequent determination of lead loading (micrograms of lead per area sampled) as described in the HUD Guidelines.[2]

4.2 Use of different pressures applied to the sampled surface along with use of different wiping patterns contribute to collection variability. Thus, the sampling result can vary between operators performing collection from identical surfaces as a result of collection variables. Collection for any group of sampling locations at a given sampling site is best when limited to a single operator.

4.3 This practice is limited to collection of settled dust samples from hard, relatively smooth nonporous surfaces. This practice is not intended for collecting settled dust samples from surfaces with substantial texture such as rough concrete, brickwork, textured ceilings, and soft fibrous surfaces such as upholstery and carpeting to name a few.

5. Apparatus and Materials

5.1 *Sampling Templates*—A 30 by 30 cm (approximately 1 ft²) reusable aluminum or plastic, or disposable cardboard or plastic template, (full-square, rectangular, square "U-shaped," rectangular "U-shaped," and "L-shaped") or alternative area that have accurately known dimensions (see Notes 1 and 2).

NOTE 1—It is recommended to collect settled dust from a minimum of a 10 by 10 cm area[3] to provide sufficient material for laboratory analysis. Use of templates or collection areas larger than 30 by 30 cm may be appropriate for surfaces that have little or no visible settled dust. A smaller sampling area (for example, 10 by 10 cm) is desired for surfaces with high levels of visible settled dust.

NOTE 2—Templates should be thin (less than 3 mm), and be capable of lying flat on a flat surface.

5.2 *Wipes*—See 2.1.5 for definition.

5.3 *Resealable Rigid Walled Containers*, 50-mL minimum volume. Screw-top plastic centrifuge tubes are an example of a suitable rigid walled container.

5.4 *Steel or Plastic Measuring Tape.*

5.5 *Plastic Gloves*, powderless.

5.6 *Disposable Shoe Covers*, optional.

6. Procedure

6.1 Don a pair of clean, powderless, plastic gloves (see Note 3).

NOTE 3—Lead contamination problems during field sampling can be severe and affect settled dust analysis results. Contamination can be minimized through adherence to the following recommendations:

(1) Change gloves frequently. Collection of each new sample must be conducted with a new pair of gloves. Powderless gloves are recommended to minimize contamination of the collected settled dust from powders used in "powdered" gloves.

(2) Clean sampling equipment and measuring tapes frequently with wipes or water.

(3) Do not open sampling kits (rigid walled containers and bulk packed wipes) until just prior to use.

(4) Use of disposable shoe covers between different buildings and removal of them prior to entering vehicles can be helpful to minimize inadvertent transfer of settled dust from one location to another.

6.2 At the beginning of a sampling period (or if a new bulk-packed container of wipes is opened), remove a minimum of the top three wipes from the container (wipe off gloved fingers with each wipe as they are removed). Use succeeding wipes from the container for sample collection (see Note 4).

NOTE 4—This procedure will minimize the risk of inadvertent contamination from dust settling into the wipe container and eliminate the potential inadvertent use of partially dried out wipes.

6.3 Use one of the following two procedures for collecting settled dust samples from each sampling location. For wide flat locations, use the template-assisted sampling procedure. For small locations (for example, a window sill or door jamb), use the confined-area sampling procedure.

6.4 Collect field blanks at a frequency of 5 % (or 1 for every 20 field samples collected). The minimum number of field blanks to collect for each batch of wipes used (each new sampling kit opened) is three. Designate the first wipe (after removal of a minimum of three wipes, see 6.2) and the last wipe as a field blank. In addition, designate a field blank during the course of collection at a given site (that is, from the middle of the wipes used to collect settled dust samples). Identify these field blanks in a manner that correlates them with the samples collected using the same batch of wipes at the same site. Utilization of a previously used batch of wipes at a new sampling site in the same manner as a new batch of wipes (that is, sample collection at each sampling site must include a minimum of three field blanks).

6.4.1 *Template-Assisted Sampling Procedure:*

6.4.1.1 Carefully place a clean template on the surface in a manner that minimizes disturbance of settled dust at the location. Either tape or place a heavy object on the outside edge of the template to prevent the template from moving during sample collection.

6.4.1.2 Using an open flat hand with the fingers together, wipe the selected surface area, side to side, in a overlapping "S" pattern while applying pressure to the finger tips (see Fig. 1). Wipe so that the entire selected surface area is covered (see Notes 3, 4, and 5).

NOTE 5—Perform the wiping procedure using the fingers not the palm of the hand.

6.4.1.3 Fold the wipe in half with the sample side folded in and repeat the preceding wiping procedure within the selected surface area using an up and down overlapping "S" pattern (see Fig. 1 and Note 6).

NOTE 6—Wipes are folded to envelope the settled dust within the wipe and avoid settled dust losses and to expose a clean wipe surface for further settled dust collection. For areas containing large amounts of settled dust, care must be taken during wiping to capture the settled dust within the wipe.

6.4.1.4 Fold the wipe in half again with the sample side folded in and repeat the wiping procedure one more time, concentrating on collecting settled dust from the corners within the selected surface area (see Note 9).

6.4.1.5 Fold the wipe again with the sample side folded in and insert the folded wipe into a rigid walled container.

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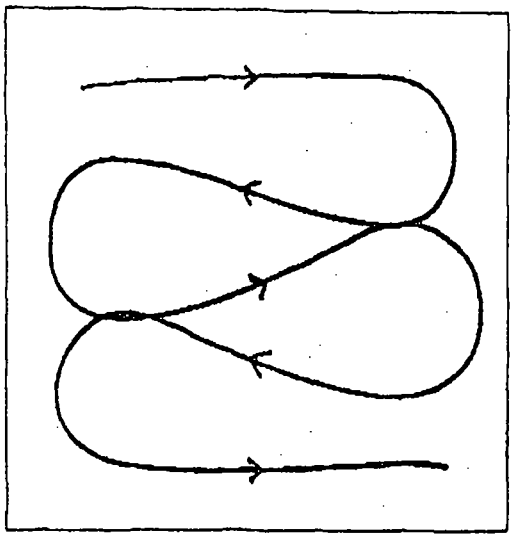
[2] *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, U.S. Department of HUD, Washington, DC, June 1995.

[3] Eller, P. M., ed., *NIOSH Manual of Analytical Methods*, 4th ed., Method No. 0700, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Cincinnati, OH, 1994.



NOTE—Only the center of wipe path is shown, not the entire wiping width. The up-and-down overlapping "S" pattern wiping path is the same path turned 90°.

FIG. 1 Example of a Side-to-Side Overlapping "8" Pattern Wiping Path

6.4.1.6 Label the rigid walled container with sufficient information to uniquely identify the sample and record the dimensions (in centimetres) of the selected sampling area (the internal template dimensions). Discard the gloves in the trash bag.

6.4.2 *Confined Area Sampling Procedure:*

6.4.2.1 Holding the fingers together and flat against the selected surface area, wipe the measured surface in one direction (see Notes 3, 4, and 5). Apply pressure to the fingers while wiping the surface.

6.4.2.2 Fold the wipe in half with the sample side folded in and repeat the preceding wiping procedure using a reverse direction within the selected surface area on one side of the folded wipe (see Note 6).

6.4.2.3 Fold the wipe in half with the sample side folded in and repeat the preceding wiping procedure one more time, concentrating on collecting settled dust from the corners within the selected surface area (see Note 6).

6.4.2.4 Fold the wipe again with the sample side folded in and insert the folded wipe into a rigid walled container.

6.4.2.5 Label the rigid walled container with sufficient information to uniquely identify the sample. Measure and record the dimensions (in centimetres) of the selected sampling area (the area actually wiped during sample collection). Discard the gloves in the trash bag.

7. Report

7.1 Field data related to sample collection must be documented in a sample log form or field notebook (see Note 7). If field notebooks are used, then field notebooks shall be bound with prenumbered pages. All entries on sample data forms and field notebooks shall be made using ink with signature and date of entry. Any entry errors shall be corrected by using only a single line through the incorrect entry (no scratch outs) accompanied by the initials of the person making the correction and the date of correction (see Note 8).

NOTE 7—Field notebooks are useful for recording field data even when preprinted sample data forms are used.

NOTE 8—These procedures are important to properly document and trace field data.

7.2 At a minimum, the following information shall be documented:

7.2.1 Project or client name, address, and city/state location,

7.2.2 General sampling site description,

7.2.3 Information as to what specific collection protocol was used,

7.2.4 Information as to what specific type or brand of wipes was used,

7.2.5 Information on quality control (QC) samples: which samples are associated with what group of field blanks,

7.2.6 For each sample collected: an individual and unique sample identifier, dimensions of the area sampled (in centimetres), the calculated area sampled (in square centimetres), and date of collection. This shall be recorded on the sample container in addition to the field documentation, and

7.2.7 For each sample collected: name of person collecting the sample and specific sampling location information from which the sample was removed.

8. Keywords

8.1 lead; sample collection; settled dust; wipe

Appendix C

Lead Source Survey Questionnaire

LEAD SURVEY QUESTIONNAIRE

A. Name of Participants:

_____

_____

_____

Address:

_____

_____

_____

Category:

☐ 6months to 6 years

☐ Pregnant Woman

Home Phone # : _____

Work Phone # :

_____

Mailing Address (if different):

_____

_____

_____

Date: _____

Comments: _____

_____

_____

B. HOUSING:

1. Do you ____ Own ____ Rent

2. Approximate age of house _____

3. Type of exterior

___ Brick — Block — Other

___ Paint ___ Siding ___ Don't know

4. Source of water:

___ City ___ Well ___ Don't know

___ Bottled ___ Other _____

5. Type of Water Piping:

____ Copper ____ Iron/Steel

____ Plastic ____ Other _____

____ Lead ____ Don't know

6. Is the exterior paint peeling?

____ Yes ____ NO

7. Is the interior paint peeling?

___ Yes ___ NO

8. Have you done any recent paint stripping, scraping, sanding?

Yes NO

____ ____

9. Type of heating fuel.

____ Gas ____ Coal ____ Don't know

____ Oil ____ Wood

____ Electricity ____ Other _____

10. Have you done any remodeling or renovations in the last 3 to 4 months?

___ Yes ___ No

11. How long have you lived in your current house? _____

If less than 6 months what was your prior address? _____

12. Other addresses where child spends significant time (relative, day care, etc.)

_____

C. OCCUPATIONS/HOBBIES:

1. Does anyone in your household work in the following occupations?

___ Smelting
___ Battery making
___ Mining
___ Automotive repair
___ Plumbing
___ Electronic manufacturing
___ Paint removal
___ Highway striping
___ Ceramics
___ Ammunition
___ Firing ranges
___ Stained glass
___ Crystal ware
___ Scrap metal recovery
___ Bridge painting

2. Is anyone in your household involved in the following hobbies?

___ Artist painting
___ Stained glass
___ Electronic soldering
___ Pottery
___ Ceramics
___ Self casting of bullets/fishing weights/figurines
___ Gun clubs
___ Home gardening

3. Have you recently purchased any new ceramic ware?

___ Yes ___ No

D. PERSONAL HYGIENE:

1. Does you cliild chew on fingernails?
___ Yes ___ No

2. Does your child suck his/her thumb?
___ Yes ___ No

3. Does your child wash his/her hands before meals?
___ Yes ___ No

4. Does your child put foreign objects in his/her mouth?
___ Yes ___ No

5. Does your child teethe on furniture, window sills, or other painted objects?
___ Yes ___ No

Appendix D

QAPP

TABLE OF CONTENTS

ATTACHMENTS

1.0 PROJECT MANAGEMENT

1.1 DISTRIBUTION LIST

Region VII EPA	Anthony Petruska, USEPA Project Manager Jim Silver, USEPA Onsite Coordinator
The Doe Run Company	Jim Lanzafame, Project Manager Gary Walker, Onsite Coordinator

1.2 PROJECT/TASK ORGANIZATION/SCOPE OF WORK

Jim Lanzafame, of The Doe Run Company, will serve as the Project Manager for the activities described in this Quality Assurance Project Plan (QAPP) to be conducted at the Herculaneum Lead Smelter Site in Herculaneum, Missouri. He will be responsible for overall coordination of site activities, ensuring implementation of the QAPP, and providing periodic updates concerning the status of the project, as needed. Gary Walker will be The Doe Run Company Project Coordinator for this activity.

One to two people will comprise the field/sampling team. The team will be responsible for assisting Doe Run with surveying activities, obtaining access to properties, acquisition and calibration of sampling equipment, sample collection, field screening, documentation of residential property conditions and field activities; and coordination of laboratory analyses. The laboratory Quality Assurance (QA) Manager will provide technical assistance, as needed; to ensure that necessary QA issues are adequately addressed.

This QAPP was prepared to address properties, which are being remediated or have been remediated. The scope of work includes obtaining property access, surveying/marking sampling cells at each property, collection of sub-surface soil samples for field screening and laboratory analyses, collection of wipe samples within the houses where the yard soil has been replaced, and lead source sampling within these houses. Some Doe Run owned houses would also be sampled after quarterly interior cleanups.

Although an attempt will be made to adhere to this QAPP as much as possible, the proposed activities may be altered in the field if warranted by site-specific conditions and/or unforeseen

hindrances that prevent any aspect of this QAPP from being implemented in a feasible manner. Such deviations will be recorded in the site logbook as necessary. This QAPP will be available to the field team(s) at all times during sampling activities to serve as a key reference for the proposed activities described herein.

1.3 PROBLEM DEFINITION/BACKGROUND/SITE DESCRIPTION

This QAPP was prepared by The Doe Run Company to address imminent and long-term concerns that could impact human health and/or the environment at the HLS site (site), where metals-contaminated soils (predominantly lead) have been identified during previous sampling activities.

The HLS site is located at 881 Main Street in Herculaneum, Missouri, about 25 miles south of the St. Louis metropolitan area (see Attachment A - Figure 1: Site Location Map). The site property is approximately 52 acres in size. An approximately 24-acre slag storage pile is located south of the smelter in a horseshoe bend of Joachim Creek. The slag pile is located in the floodplain of Joachim Creek, in an area classified as a wetland. The smelter site is bordered on the east by the Mississippi River and on the north and west by residential areas. South of the smelter is the slag pile and wetland area. The slag pile is bordered to the east, west, and south by Joachim Creek, and to the north by residential areas and the smelter facility (see Attachment B - Figure 2: Aerial Photography). The slag pile and most of the smelter facility are located in Jefferson County, Section 29, T. 41 N., R.6 E., although the northern portion of the facility extends into Section 20. Geographic coordinates of the site are 38° 15' 19.0" north latitude and 90° 22' 56.7" west longitude.

The site is an active lead smelter, the largest of its kind in the United States. HLS began operations in 1892 as part of the St. Joseph Lead Company. In 1986, it became part of the newly formed Doe Run Company (Doe Run), a joint venture of the Fluor Corporation and the Homestake Mining Company. In 1990, the Fluor Corporation became the sole owner of Doe Run. The site consists of three main areas: (1) the smelter plant, located on the east side of Main Street; (2) the slag storage pile; and (3) office buildings on the west side of Main Street.

The following major processes occur at the HLS site: (1) sintering, smelting, and refining of lead ore; (2) sulfuric acid production from waste sulfur-containing gases generated by the sintering operation; and (3) wastewater treatment. The smelting operation generates a molten slag, 20

percent of which is sent to a slag storage pile. The slag pile occupies approximately 24 acres in the floodplain of Joachim Creek, and is up to 40 feet tall in some sections. In 1993, during a major flood event, water reached several feet up the sides of the slag pile. The site also generates stack air emissions from the smelter and fugitive air emissions from various operations (MDNR, 1999).

Stack and fugitive emissions from the site, and fall-out from these emissions, have resulted in releases of lead, cadmium, and sulfur dioxide to the air and soil. Since 1980, the smelter's emissions have been regulated under general and site-specific regulation established in the SIP. Lead emissions at one air monitoring station near the site have consistently been above the 1.5 microgram per cubic meter ($\mu g/m^3$) National Ambient Air Quality Standard (NAAQS), since it was installed in 1992. Due to the continued noncompliance with the NAAQS standard, new SIP regulations were developed by the site and MDNR.

Soil sampling has shown lead levels ranging from 100 to higher than 12,800 parts per million (ppm) in the surface soils of homes surrounding the smelter. In August of 2001, EPA was notified by a Herculaneum citizen of a gray powdery substance on the roads in the town. Further investigation identified the substance containing lead at 300,000 ppm or 30%. Additional field screening identified the trucks delivering lead concentrate to the Doe Run Smelter as the likely source of the material along the haul routes in the town.

1.4 PROJECT/TASK DESCRIPTION

The activities described in this QAPP will address the following:

A. Surface soil contamination in residential yards, day-care facilities, areas in schoolyards frequented by children, parks, and all other child high-use areas affected by the HLS operations located east of and adjacent to U. S. Highway 61 and north of Joachim Creek in the township of Herculaneum.

B. Subsurface soil in residential yards, day-care facilities, areas in schoolyards frequented by children, parks, and all other child high-use areas affected by the HLS operations located east of and adjacent to U. S. Highway 61 and north of Joachim Creek in the township of Herculaneum, after contaminated soil is removed and before new soil is put in place.

C. Clearance sampling using wipes samples within homes after cleaning.

D. Interior sources sampling for lead within the home.

1.5 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The QA objective for this project is to provide valid data of known and documented quality. Specific Data Quality Objectives (DQO's) are discussed in terms of accuracy, precision, completeness, representativeness, and comparability.

For this project, accuracy is defined as the ratio, expressed as a percentage, of a measured value to a true or reference value. The measurement process of a contaminant concentration includes separate field and laboratory measurements. Errors are associated with each of these two types of measurements. These errors will be quantified and expressed as a measure of accuracy. The analytical component of accuracy will be expressed as Percent Recovery based on the analysis of lab-prepared spike samples and Performance Evaluation (PE) audit samples.

Precision for this project is defined as a measure of agreement among individual measurements of the same property and will be expressed via duplicate samples. The overall precision is assessed by collection of duplicate or collocated samples. Approximately 10% of duplicate/collocated samples are anticipated.

Data completeness will be expressed as the percentage of data generated that is considered valid. A completeness goal of 100% will be applied to this project; however, if that goal is not met, site decisions may still be made based on the remaining data. No specific critical samples have been identified for the project.

Representativeness of collected samples is facilitated by establishing and following criteria and procedures identified in this QAPP.

Data comparability is achieved by requiring all data generated for the project be reported in common units. The following table lists the various types of data that will be generated and the specific reporting units.

SPECIFIC DATA REPORTING UNITS	
PARAMETER	UNIT
Metals in Soil by X-ray Fluorescence Spectrometer (XRF) Lead in painted surfaces	PPM PPM
Metals in Soil by Laboratory Analysis Lead in wipe samples by Laboratory Analysis	milligrams per kilogram (mg/kg) ug/ft2
Metals in Air	micrograms per cubic meter ($\mu g/m^3$)
Sampled Air Volume at Standard Temperature and Pressure (STP)	cubic liters at STP (m^3 STP)
Sampling Flowrate at STP	cubic liters per minute at STP (m^3/min STP)
Wind Speed	miles per hour (mph)
Wind Direction (Field Report)	degrees on an azimuth compass
Temperature	degrees Farenheit (°F)
Barometric Pressure (not corrected to sea level)	Millimeters of mercury (mm Hg)
Time	military time (00:00 - 24:00)
Date	month/day/year

1.6 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

All site personnel, depending on the type of work being done, will be required to have completed basic OSHA Lead Training, or modified Lead Abatement Training, or 40-hour health and safety (Hazardous Waste Operations or Emergency Response [HAZWOPER]) training course and annual refreshers. Familiarization with the Niton™ XRF and its operating procedures will also be necessary for the site operators using such equipment.

1.7 DOCUMENTATION AND RECORDS

Doe Run/Contractor personnel will maintain records of pertinent activities associated with the sampling events. Appropriate documentation pertaining to activities will also be recorded in the field logbook. Information pertaining to all samples (i.e., sampling dates/times, locations, etc.) collected during this event will be recorded on sample field sheets generated by Doe Run. Labels generated by the sampler will be affixed to sample containers, identifying sample numbers; dates collected, and requested analyses. Chain of custody records will be completed/maintained for all samples from the time of their collection until they are submitted to the laboratory for analysis.

Doe Run will prepare a health and safety plan prior to the field activities that will address site-specific hazards. The health and safety plan will be reviewed and signed by all field personnel prior to fieldwork, indicating that they understand the plan and its requirements. Copies of the plan will be available to all personnel throughout the sampling activities.

2.0 MEASUREMENT/DATA ACQUISITION

2.1 SAMPLING PROCESS DESIGN

The proposed sampling scheme for this project will be in accordance with the Removal Program Representative Sampling Guidance, Volume 1: Soil, OSWER Directive 9360.4-10, November 1991, Interior wipe sampling, ASTM 1728 -95, and judgmental (based on the best professional judgment of the sampling team). The sampling design proposed in the following paragraphs has been selected to identify the extent of soil contamination at the site, subsurface lead levels after excavation, interior lead source sampling and clearance sampling within the house.

The characterization sampling will be conducted as soil replacement is concluded.

At a minimum, residential properties will have four quadrants established around the home, which will radiate out 50 feet from each side of the home. In each quadrant, a nine-aliquot composite sample will be collected from the upper 1 inch of soil in the surface or the excavated subsurface and screened with a Niton™ XRF. Therefore, a minimum of 4 four samples will be collected from each residential property. Surface soil samples will not be collected from within 3 feet of the residential

dwellings to reduce the potential lead-based paint contribution to soil-lead concentrations. In addition, multi-aliquot surface soil samples will be taken at the drip line of each structure where a child under 6 years old with elevated blood lead is known to reside. Multi-aliquot surface soil samples will also be collected from any play areas, gardens, sand piles, unpaved driveways, and other areas appearing to be frequented by children. The number of aliquots for these areas will be dependent upon size, but, in general, will follow the aliquot density used for the quadrants. For subsurface sampling four quadrants will be generally sampled, each will be composed of 9 aliquots of subsoil.

In addition to soil sampling at residential properties, indoor dust wipe samples will be collected at residential homes where soil replacement has already occurred and where interior cleanup has occurred.

After the clearance samples have been taken a lead source survey will be conducted in accordance with the Interior Dust Clean-up Plan. A Niton XRF will be used to make this survey of painted surfaces. The paint will also be evaluated as to conditions, good, fair or poor condition.

Workers doing soil removal and cleaning interior cleaning will be monitored for lead in air per OSHA requirements, 29CFR1910.1025.

A summary of anticipated samples to be collected for this project is provided in the following table. The exact number will depend on field screening results, as previously described. Approximately 10 percent of all screening samples will be collected for laboratory confirmation analysis whether related to soil, subsurface soil or interior dust. The source sampling will be conducted using only XRF readings.

Matrix	Number of Samples		Laboratory Analyses[1]
	Field Screening (Lead)	Laboratory	
Surface Soil	40	4	Lead, cadmium, arsenic, zinc, nickel
Dust	320	32	Lead
Air	NA	4	Lead

Subsurface Soil	400	40	Lead, cadmium, arsenic, zinc, nickel

NA = Not Applicable
[1] See Section 2.4 for details pertaining to analyses.

2.2 SAMPLING METHODS REQUIREMENTS

Soil samples will be collected following the EPA Region 7 SOP #2231.12A: ERT #2012; "Soil Sampling". Confirmation soil samples will be collected with a clean, dedicated stainless steel spoon and homogenized in a clean, dedicated aluminum pie pan or shot directly in the sample bag. The samples will be screened with the XRF after homogenizing the soil, and three consecutive XRF readings will be collected, each at 20 nomsec. The three homogenized XRF readings will be recorded on a field sheet. The average of these results will be considered the result. Screening samples using the XRF will follow EPA Region 7 SOP # 4231.707A. The location of the XRF readings (as well as confirmation sample location, if necessary) will also be recorded on each field sheet. Confirmation samples will be transferred directly into the appropriate container for analysis. The samples will be submitted to a subcontracted laboratory.

Indoor dust sampling will be conducted in accordance with ASTM E 1728 -95 with judgment of the sampler. A wipe sample media will be used for each sample. The dust sample will be collected from a one square foot area on hard non-porous floor surfaces and for windowsill areas the area will be measured. To the extent that hard surfaces are available the sampling area will include high traffic areas, children bedrooms, and one windowsill interior to the window. Pertinent sampling information will be documented on field sheets. The dust wipe sample will be transferred directly into a dedicated container for XRF analysis or later laboratory analysis. Failure to achieve the clearance criteria by XRF analysis will require additional cleanup

All ambient air sampling will be accomplished using Personnel samplers, MSA, flowing at the rate of 2.0lpm for the cleaning period or until 7 hours has been achieved. In all cases, the policies described in this QAPP shall take precedence over other EPA SOPs. Each sampler will be positioned in the workers breathing zone per OSHA requirement and will be shut off when the worker leaves the work site.

Paint readings from the XRF will be recorded in a manner, which will allow future identification of where lead can be found within each room if it is present. The operator will make a rating of the paint condition.

Disposal of investigation-derived wastes (IDW), house cleanup waste and procedures for equipment/personal decontamination will be addressed in a site-specific health and safety plan prepared by the Doe Run. In general, it is anticipated that most IDW will consist of disposable sampling supplies (gloves, paper towels, etc.) that will be disposed of off-site as uncontaminated debris. Vacuum materials will be taken to the plant where they will be disposed of in a container setup for this purpose.

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Samples will be collected in accordance with procedures defined in Region VII EPA SOP 2130.4B. Chain of custody procedures will be maintained as directed by Region VII EPA SOP 2130.2A. The contracted laboratory according to their specific procedures and SOPs will accept samples.

All soil sample containers will be placed in plastic bags to control spillage in case the containers break during shipment. Soil and dust samples will be placed in suitable containers for shipment. Necessary paperwork for all samples, including chain of custody records, will be completed by the sampling team and maintained with the shipping containers until delivery to the laboratory. If shipment of the samples is required via commercial service, each container lid will be securely taped shut. The samples will be submitted to the receiving laboratory in a time-efficient manner to ensure that the applicable holding times are not exceeded.

2.4 ANALYTICAL METHODS REQUIREMENTS

The samples will be analyzed at a pre-qualified laboratory contracted by The Doe Run Company, according to the EPA methods listed in the following table. Detection limits that are typically reported by those methods are expected to be adequate for this activity. The requested analyses have been selected based on past sampling data and historical information collected for the site:

ANALYTICAL METHODS

Analytical Parameter [1]	EPA Method Number
SOIL/DUST	
Lead, cadmium, arsenic, zinc, nickel	SW846 Method 6010B
AIR	
Lead	SW846 Method 6010 B and 7000 Series

Wipe samples will be analyzed in accordance with ASTM method E 1728 95.
Dust samples will be analyzed for lead only
[1] EPA may cease the analysis for zinc and nickel content if zinc and nickel concentrations in the initial confirmation samples are consistently below MDNR's Any Use Soil Levels.

2.5 QUALITY CONTROL REQUIREMENTS

Because dedicated supplies will be used for all samples (i.e., stainless steel spoons, pie pans, etc.), no QC samples will be required to assess the potential for cross-contamination. Analytical error (precision and accuracy) will be determined by the analysis of laboratory-prepared duplicates and spike samples. These criteria, along with other laboratory QC elements, will be performed in accordance with the contract laboratory's quality assurance plan.

To satisfy the quality control elements for the XRF, data will be collected and analyzed for comparability to laboratory data, to determine detection and quantification limits, and to determine accuracy and precision. Daily NIST samples supplied with the XRF will be run. The mean of the three XRF readings taken for each confirmation sample will be compared statistically to the laboratory results for each confirmation sample to assess comparability. The measure of agreement (r^2) for the XRF unit should be above 0.7 or greater for the XRF data to be considered screening level data.

For every measurement, the Niton™ gives an uncertainty range that represents a 95 percent confidence interval. In general, precision/accuracy increases with increasing sample run time. Due to preliminary sample results indicating high lead levels, XRF sample run time will be increased accordingly to improve precision and accuracy. The goal is for samples to be screened long enough to obtain precision measurements within 20% of the actual concentrations. In the case

of wipe samples the Niton will be ran for a minimum of 60 nomsec in order to get this greater accuracy.

2.6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Doe Run/ Doe Run Contracted personnel prior to deployment for field activities will perform testing, inspection, and maintenance of all sampling equipment and supplies, along with field screening instrumentation. Testing, inspection, and maintenance of analytical instrumentation will be performed in accordance with the contracted laboratory's analytical SOPs and manufacturers' recommendations.

2.7 INSTRUMENT CALIBRATIONS AND FREQUENCY

Calibration of the field screening and laboratory analytical instrumentation will be in accordance with the referenced SOPs and manufacturers' recommendations.

2.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

All sample containers will meet EPA criteria for cleaning procedures required for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in *Specifications and Guidelines for Obtaining Contaminant-Free Sample Containers.* The certificates of cleanliness will be maintained in the project file.

2.9 DATA ACQUISITION REQUIREMENTS

Previous data/information pertaining to the site (including other analytical data, reports, photos, maps, etc., which are referenced in this QAPP) have been compiled by Doe Run from various sources including EPA's START Team. Some of that data has not been verified; however, that information will not be used for decision-making purposes without verification of its authenticity.

2.10 DATA MANAGEMENT

All laboratory data will be managed as specified in the contract laboratory's QAM. The project coordinator on site will receive preliminary data. The final data package will be forwarded to a chemist trained in data validation to complete the validation process. The results will be summarized and included in the report submitted to EPA.

3.0 ASSESSMENT/OVERSIGHT

3.1 ASSESSMENTS AND RESPONSE ACTIONS

Assessment and response actions pertaining to analytical phases of the project are addressed in the contracted laboratory's quality assurance manual(s). Because of the short duration of this sampling event, no field audits of sampling procedures will be performed. Corrective actions will be taken at the discretion of the EPA Project Manager, whenever there appears to be problems that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to the site.

3.2 REPORTS TO MANAGEMENT

A letter report describing the sampling techniques, locations, problems encountered (with resolutions to those problems), and interpretation of analytical results will be prepared by Doe Run, following completion of the field activities described herein and validation of laboratory data. The laboratory data for soil samples will be compared to all applicable or relevant and appropriate requirements (ARARs), including removal action levels that have been established for the site, to determine whether further response is warranted.

4.0 DATA VALIDATION AND USABILITY

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

A qualified laboratory analyst and the laboratory's section manager in accordance with the contracted lab's quality assurance program will perform data review and verification. The Doe Run Project Manager will be responsible for overall validation and final approval of the data, in accordance with the projected use of the results.

4.2 VALIDATION AND VERIFICATION METHODS

A qualified Doe Run chemist will review the data for laboratory spikes/duplicates and laboratory blanks to ensure that they are acceptable. The Doe Run Project Manager will inspect the data to provide a final review. The Doe Run Project Manager will also compare the sample descriptions with the field sheets for consistency and will ensure that any anomalies in the data are appropriately documented.

4.3 RECONCILIATION WITH USER REQUIREMENTS

If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded, and re-sampling and/or re-analysis may be required.

Only accredited laboratories experienced in Lead analysis will be used for analysis of the clearance samples.